



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL AND R. P. BAKER.

Send all communications to B. F. FINKEL, Springfield, Mo.

PROBLEMS FOR SOLUTION.

ALGEBRA.

450. Proposed by J. E. ROWE, Pennsylvania State College.

If the four roots of the quartic equation $A \equiv a_0x^4 + 4a_1x^3 + 6a_2x^2 + 4a_3x + a_4 = 0$, are so related that $B \equiv a_0a_4 - 4a_1a_3 + 3a_2^2 = 0$, show by elementary algebra that two roots of A are real and two imaginary. Show also by means of elementary algebra that A cannot have two equal roots without having three, if the condition $B = 0$ is satisfied.

451. Proposed by H. S. UHLER, Yale University.

Prove that

$$\frac{\sin x}{x} = \cos \frac{x}{2} \cos \frac{x}{2^2} \cos \frac{x}{2^3} \cos \frac{x}{2^4} \dots$$

GEOMETRY.

481. Proposed by PAUL CAPRON, U. S. Naval Academy.

Show that the locus of the intersection of a pair of perpendicular normals to a parabola $y^2 = 4px$ is the parabola $y^2 = p(x - 3p)$.

482. Proposed by ROBERT G. THOMAS, The Citadel, Charleston, S. C.

In laying out a kite-shaped mile race-track, composed of a circular arc and two intersecting tangents at the ends of the arc, determine the angle at the center of the arc (a) when the length of the arc equals the sum of the two tangents, and (b) when the arc is equal to the length of each tangent.

CALCULUS.

402. Proposed by C. N. SCHMALL, New York City.

If (x, y) be a double point on the curve $u \equiv f(x, y) = 0$, show that (1) the two branches of the curve will cut orthogonally if

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0;$$

and (2) if this point be made the origin, then the equation of the tangents to the branches will be

$$(y'^2 - x'^2) \frac{\partial^2 u}{\partial x^2} + 2x'y' \frac{\partial^2 u}{\partial x \partial y} = 0,$$

where (x', y') are the current coördinates of points on the tangents.

NOTE.—In an early issue, we will publish all the unsolved problems in Number Theory proposed from January, 1913, to December, 1915. EDITORS.

SOLUTIONS OF PROBLEMS.

ALGEBRA.

439. Proposed by A. M. KENYON, Purdue University.

If k, n are natural numbers, $n > 2k$, show that

$$\frac{2^k}{|k|} \sum_{i=0}^{I(\frac{n+1}{2})} \frac{1}{|2i+1| |n-k-2i|} = \frac{2^n}{|n+1|} \sum_{i=0}^k \binom{n-i}{n-k},$$

where $I(n/2)$ denotes the integral part of $n/2$ and $\binom{n}{k}$ is the coefficient of x^k in $(1+x)^n$.